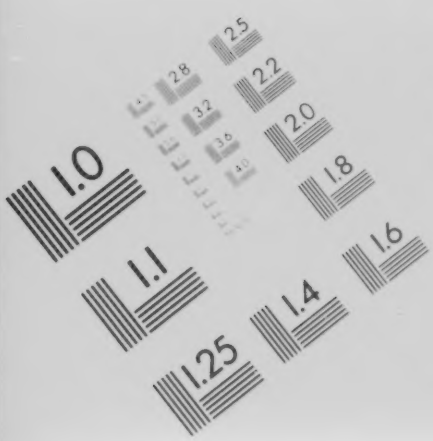

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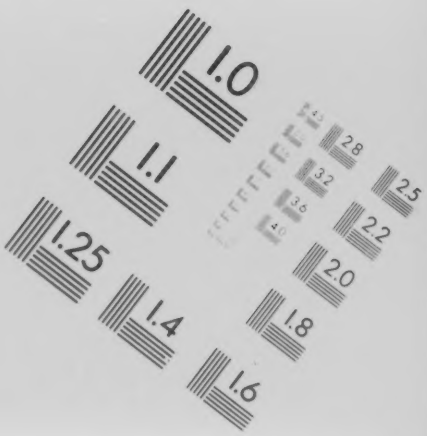

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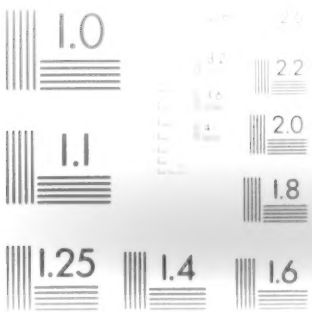

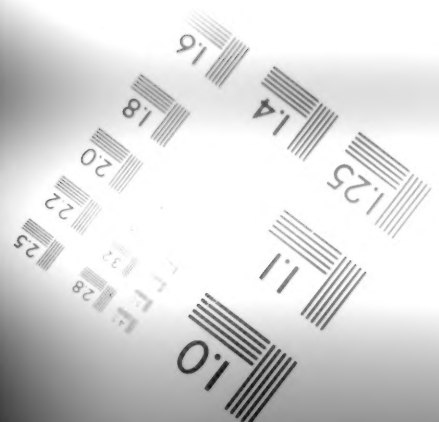

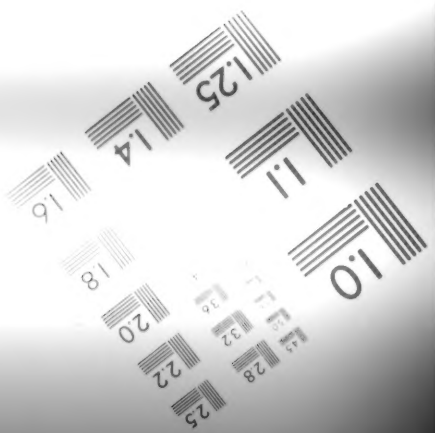

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A SNAPSHOT OF UPPER ELEMENTARY AND MIDDLE SCHOOL SCIENCE TEACHERS' SELF-EFFICACY AND OUTCOME EXPECTANCY

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In the last five years, many science education initiatives appear to newly emphasize (or continue emphasizing) two important issues- professional development sustained over time, and the need for summer institute attendees to share their knowledge with peers (e.g. Ohio's State Systemic Initiative, Purdue's Epicenter program, AAPT, PTRA program, Woodrow Wilson Fellowship Foundation).

During the last five years, the National Aquarium in Baltimore conducted an extensive data collection in an effort to (a) investigate the mechanism by which "master" science teachers instruct peers and (b) explore ways to optimize professional development for science teachers sustained over time. One component of the data collection involved evaluating "local" teachers who attended outreach provided by "master" teachers. The "local" teachers completed a survey during outreach and approximately 1 year later. Master teachers presented the outreach in districts throughout the United States. The "local" teachers provided data concerning self-efficacy, outcome expectancy and ethnicity as well as the approximation of their own students' economic status, geography, and ethnicity. Analysis of these data provides important guidance that educators can use to improve science summer institutes, and most importantly to better understand those science teachers who may commonly attend outreach provided by "master" science teachers, but who do not (for whatever reason) attend multiple week summer institutes.

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These data are very important for all those interacting with science teachers, but it is of particular importance for those involved in the planning and structuring of outreach with emphasizes "local" outreach using "master" teachers.

Data Collection

Prior to the start of each one-day outreach institute implemented by master teachers, every attending local teacher completed the self-efficacy scale of Riggs and Enochs (1990). This instrument has survey items that work together to define the two latent traits of outcome expectancy and self-efficacy. Numerous presenters at past AETS conferences reported data collected with this instrument. Local teachers supplied their names as well as their mailing address for the one-year follow-up survey. In the follow-up administration of the Riggs and Enochs (1990) survey, the local teachers supplied the following information: percentage of their students as a function of ethnicity (Asian, African-American, Hispanic, Pacific Islander, Native American, White); percentage of their students as a function of economic level (poverty, low income, middle income, upper income), percentage of students as a function of geography (rural, rural/suburban, suburban, urban). In total, 225 local teachers completed the follow-up survey (50% response rate).

Data Analysis

The authors computed two measures of self-efficacy as outlined by Riggs and Enochs (1990) for each local teacher who completed the follow-up survey. Using the Rasch measure, to take into consideration the non-linearity of the rating scale, the authors reported these two measures (outcome expectancy, self-efficacy) in Rasch log odds units (Wright & Masters, 1982).

It is important to point out that investigation regarding "local" teachers in reality refer to teachers who are predominately White, but who do teach a range of students (ethnicity, SES, geographic).

The authors used two-way ANOVA tests to investigate the differences between the self-efficacy and outcome expectancy of local teachers dependent upon the levels of ethnicity, geography, and SES of their students.

The authors calculated each level of the variables (ethnicity, geography, and SES) using the following procedure. A local teacher that would classify (a) 50% of his/her students as Asian would be a teacher of Asian students, (b) 50% of his/her students as African-American would be a teacher of African-American students, and so forth. The authors used the same strategy to classify teachers as a function of students' geography and SES levels. Combination and stratification of the data helped the authors define the levels for each variable; ethnicity (white, minority); geography (suburban, urban); SES (poverty/low, middle/upper). Minority included a combination of the classification of Asian, African-American, Hispanic, Pacific Islander, and Native American.

Results

Outcome Expectancy

With an alpha level of .05, the analysis of local teachers' reporting of the percentage of students living at different economic levels, different geographic locations, and different SES regarding their score on outcome expectancy showed no significant difference. In other words, the authors found no significant differences in outcome expectancy (belief in what students can do) for different levels of their student's ethnicity, geography, and SES.

Self-Efficacy

The authors found similar results when investigating self-efficacy. The self-efficacy (confidence) of teachers is no different when analyzed regarding different levels of their student's ethnicity and geography. However, the authors found that there was a near significant difference between the levels of SES (poverty/low and middle/upper income), F (1, 148) = 3.65, p = .05. Teachers classifying their students as middle/upper income had a higher self-efficacy as compared with teachers classifying their students as poverty/low income.

Conclusion

One of the goals of this data collection and analysis was to better describe and understand the types of teachers attending the one-day outreach offered by master teachers. From the results, we concluded that the outcome expectancies of teachers were not dependent upon their students' economic level, geography, or ethnicity. Also, the teachers' self-efficacies were not dependent upon their students' geography or ethnicity. However, "local" teachers that classified their students as from a middle/upper income background had a higher self-efficacy as compared with "local" teachers who classified their students as poverty/low income.

The results indicated that the teachers' outcome expectancy was not dependent on the student's economic level; however, teachers' self-efficacy was significantly different between middle/upper income students and poverty/low income students. This discrepancy could be due to the instrument for measuring outcome expectancy and self-efficacy. Perhaps, the instrument was not measuring what we think it was measuring.

In addition, due to small and empty cell sizes within the ANOVA table, we combined and eliminated demographic variable levels. These combinations and elimination could have influenced the data analysis.

We believe that the results (as evaluated) indicate self-efficacy data could reveal underlying issues. For example, according to the outcome expectancy results, a teacher with poverty/low income students and middle/upper income students feel that there is no difference between these two groups based on what the students can do. However, if either group of students fall below the success level, the teacher would first fault themselves, thus, affecting their self-efficacy (confidence). For science educators involved in summer workshops and/or professional development focusing on outcome expectancy, we suggest the need to analyze self-efficacy preceding or in conjunction with outcome expectancy analysis.

References

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